



# Hydrometeorology Testbed

The Hydrometeorology Testbed (HMT) is a national research strategy of regional demonstration projects directed to improving the accuracy and lead time of extreme precipitation and flood forecasts and warnings, to better understand and manage water resources in a changing climate. HMT is an end-to-end process aimed at accelerating the development of new science and technologies, and enhancing their infusion into the daily operations of the NWS and the emerging NOAA Climate Service.



## Why Extreme Precipitation?

A recent study supported by the USWRP revealed that 70% of Americans feel that precipitation forecasts are most important to them. Yet forecasting precipitation remains a major challenge, especially the extreme events.

In one season alone in California, only 2 of the 16 extreme precipitation events were correctly predicted with 24-hour lead time. Flash floods and flooding are among the leading natural causes of the loss of life and property, accounting for the largest share of Presidential disaster declarations in any given year.

Global climate change is expected to lead to greater extremes: leading to scenarios of too much water or too little water or even both. This will further exacerbate the challenges of water resource management, which is aimed at balancing the needs of flood protection, and storage for domestic, industrial and

## TOOLS FOR WATER IN A CHANGING CLIMATE

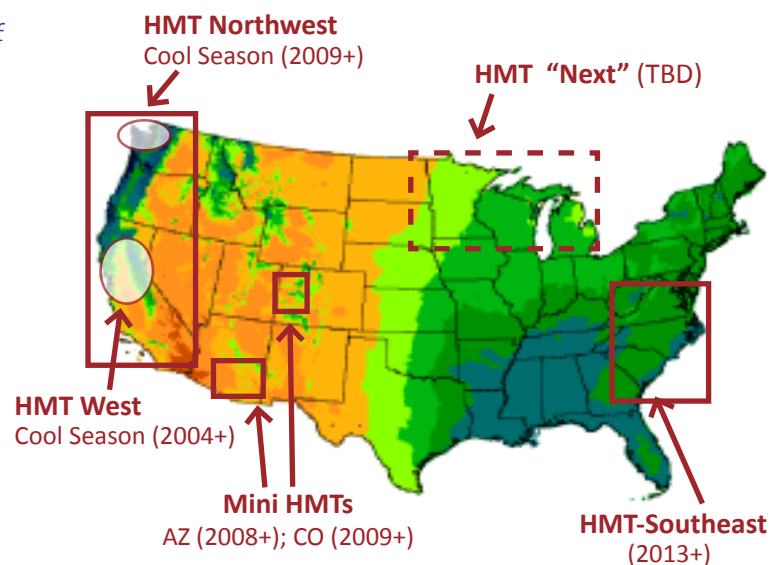
agricultural consumption, recreation and the maintenance of healthy ecosystems. This balance is predicated upon access to accurate precipitation forecasts. HMT is aimed at supporting this balance.

## What is HMT?

Guided by both NWS operational requirements and by emerging scientific questions and new technologies, HMT directly engages the forecasters and scientists in the research and development process. New ideas, technologies and predictive models are developed, demonstrated, evaluated and refined through the testbed, and are then transitioned to operations. This will include linkages to and impacts on the NOAA Climate Service.

HMT's activities are focused on the causes of extreme precipitation and the attendant flooding:

- Monitoring precipitation
- Predicting precipitation
- Determining the type of precipitation (rain or snow?)
- Coupling precipitation to what happens on the surface: snow pack; soil moisture; runoff; flooding & debris flow
- Developing decision support aids: providing not just more information to the front line forecasters and other users, but better information for decisionmaking
- Verification: building credibility in the new products and services



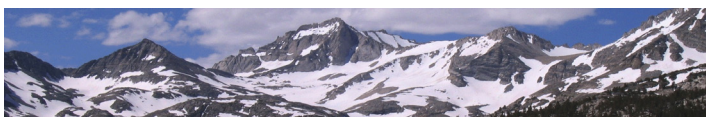
# PREPARING FOR THE FUTURE

## What's Next?

HMT originated from studies of land-falling storms in the Pacific – storms whose intensity and impact rivals that of hurricanes on the East Coast. It was recognized that for this research to have an enduring operational impact, a new way of conducting research was required. The year 2005 saw the first full implementation of the NOAA Hydrometeorology Testbed on the West Coast. The testbed has since grown and evolved, and HMT is poised to establish a new testbed. HMT's plans for the next five years include:

**HMT-West:** The Sacramento area is considered to be among the nation's most at risk regions where a major flood could occur. Building on a ten-year effort in California, HMT-West uncovered the major role that atmospheric rivers play in producing extreme precipitation and flooding. As storms travel across the Pacific, they tap into tropical moisture creating long ribbons of moist air known as atmospheric rivers. When this happens, a normal storm can turn deadly. HMT has developed tools that are now being demonstrated and refined in HMT. HMT-West will continue to engage in intensive field studies and demonstrations in Northern California and elsewhere in the west, creating records of climatic import.

Long-term, HMT-West will continue to foster further transition of relevant research to weather and climate operations. In partnership with the State of California, HMT is implementing key monitoring and forecast tools through the *Enhanced Flood Response and Emergency Preparedness Program*. The HMT net-



### Water and a Changing Climate...

"Within the United States, extensive climate-related changes have been documented over the last century. These include increases in continental-average temperatures, rising sea levels in many coastal locations, an increased frequency of extreme heavy rainfall events, lengthening of the growing season, earlier snowmelt, and altered river flow volumes. Water is an issue in every region, but the nature of the potential impact varies. Drought is a serious problem in many regions, especially in the West and Southeast; and floods and water quality problems are likely to be amplified by climate change in most regions."

– Dr. Jane Lubchenco, NOAA Administrator



Flooding in Greenville, NC from the Tar River caused by Hurricane Floyd in September of 1999. Photo by Dave Saville, FEMA News.

work is also the framework from which the State of California and NOAA are exploring the linkages between atmospheric rivers, aerosols, and precipitation through the *CalWater Program*: an effort aimed at understanding human induced changes to the climate and affects on long-term water supplies

**HMT-Southeast:** Planning is now underway for HMT-Southeast, projected to begin ramping up in 2011 in North Carolina. The Southeastern United States faces unique hydrometeorological challenges from winter storms, summer convection and land-falling tropical storms and hurricanes.

## HMT Outcomes

- Improved scientific knowledge of conditions that create extreme precipitation.
- Improved assessment of current conditions and forecasts.
- New observations to support long-term monitoring of our changing climate.
- Improved weather and water information that allows for more efficient management and use of water resources to balance numerous and often competing interests.
- Demonstration of regional testbeds as conduits to infuse new science and technology into operations.
- Increased protection of lives and property through improved forecasts of hazardous weather.



<http://hmt.noaa.gov/>

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